Typical and atypical prosody in European Portuguese: A prosodically annotated corpus for children with autism and typically developing peers (PAC-C)

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Introduction

Language is usually studied in terms of words and sentences, which are crucial for conveying ideas, beliefs, and instructions to others; however, prosody is another aspect of language that is equally important. There is research quantifying expressive prosodic disorders in autism spectrum disorders (e.g., [1]). Nevertheless, investigation into the ability of children with autism to produce prosody is needed, because no consensus has emerged on the characterization of this prosodic profile. In this study we developed a prosodically annotated corpus for psycholinguistic and neuropsychological research incorporating productions of children with autism and typically developing peers.

AIM: To introduce a prosodically annotated corpus of 2304 utterances produced by children with typical and atypical development.

Method

Participants:

- **18 children** (12 boys) **with high-functioning autism** (HFA; 5 - 15 years, *M* = 8.06, *SD* = 2.31) who met the DSM-5 criteria for Autism [2]. The additional methods used in the diagnostic procedure were the Autism Diagnostic Interview-Revised (ADI-R; [3]) and the Autism Diagnostic Observation Schedule - Second Edition (ADOS-2; [4]). Also, all HFA participants were required to have an IQ ≤ 70.
- **18 typically developing peers** (TD) matched on age (*M* = 8.06, *SD* = 2.31), nonverbal intelligence (assessed with the Raven's Coloured Progressive Matrices), and gender.
- All participants were native speakers of European Portuguese, born and raised in monolingual homes in the North of Portugal, with no visual or hearing problems.

Material & Procedure:

- The utterances were collected with the European Portuguese Version of the Profiling Elements of Prosodic Systems – Communication [5]. In particular, we used the four expressive tasks of the functional level:

  (1) Turn-end Expression: to assess the ability to produce questioning versus declarative intonation *(N*= 16 utterances).

  (2) Affect Expression: to assess the ability to express liking or disliking intonation (*N*= 16 utterances).

  (3) Chunking Expression: to assess the ability to produce syntactically ambiguous sentences disambiguated by prosody (*N*= 16 utterances).

  (4) Focus Expression: to assess the ability to produce focus *(N*= 16 utterances)
- Post-processing of the data included slicing the recording sessions into individual sound files containing individual utterances (that correspond to a response). A total of **2304 individual utterances produced by children with typical and atypical development were included in the Corpus**.
- After this, **three raters judged each utterance** (1) as declarative or interrogative (for the Turn-End subtest); (2) as liking or disliking (for the Affect subtest); (3) chunking (for the Chunking subtest); and (3) focus (for the Focus subtest).
- Additionally, for the **intonational analysis** of the utterances produced, we adopted the Autosegmental-Metrical Model of intonational phonology [6] and we used the Tones and Break Indices framework [7] adapted for Portuguese [8]. This analysis performs a phonological analysis of the nuclear contour patterns obtained in the data.

Results

The present corpus consists of 2304 utterances expressing typical and atypical declaratives and interrogatives (see Fig. 1), expression of liking (see Fig. 2) and disliking, distinctive chunking of syntactically ambiguous utterances (see Fig. 3), and distinctive use of focus (see Fig. 4). Detailed perceptual and intonational characterization for each utterance was conducted. This information and the set of utterances itself are available for research and intervention (contact the first author of the poster).

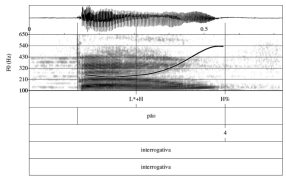

Figure 1: Typical F0 contour of the word 'pão' produced as interrogative. The label tiers indicate the tonal analysis, the orthographic transcription, the break indices (BI), the target utterance, and the utterance produced according to raters, respectively.

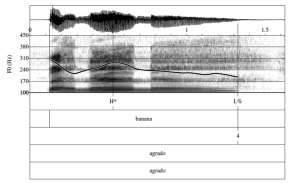

Figure 2: Typical F0 contour of the word 'banana' produced as liking. The label tiers indicate the tonal analysis, the orthographic transcription, the break indices (BI), the target utterance, and the utterance produced according to raters, respectively.

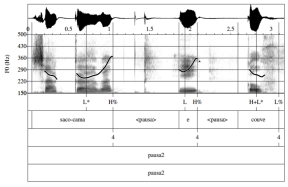

Figure 3: Typical F0 contour of the utterance 'saco-cama e couve', with 'saco' and 'cama' forming one chunk. The label tiers indicate the tonal analysis, the orthographic transcription, the break indices (BI), the target utterance, and the utterance produced according to raters, respectively.

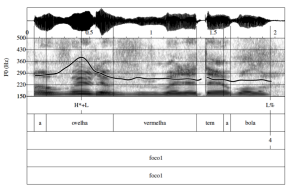

Figure 4: Typical F0 contour of the utterance 'a ovelha vermelha tem a bola', with focus on the word 'ovelha' (early focus). The label tiers indicate the tonal analysis, the orthographic transcription, the break indices (BI), the target utterance, and the utterance produced according to raters, respectively.

Conclusion

This data can help to answer specific questions of general attention for researchers interested in quantifying expressive prosodic disorders. We also suggest that this corpus may impact on the current prosodic intervention techniques. We hope that this work will pave the way for a more detailed analysis of atypical prosody and for further basic, applied, and translational research.

References:
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